

Metal Fatigue Causing Cystoscope Rupture During Bladder Neck Incision

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ABSTRACT

The modern cystoscope is the result of the advancement in technology in numerous areas and is an invaluable tool that allows the urologist to perform a number of diagnostic and therapeutic procedures. Although various degrees of endoscope failure have been widely reported, instrument breakage that leads to a foreign body has not. While performing a bladder neck stricture incision for a 72-year-old male patient with a previous radical prostatectomy for prostate cancer and a resulting bladder neck stricture, we documented a major 17-French cystoscope malfunction and a resulting foreign body that was retrieved from the bladder using a 22-French scope and alligator forceps.

Key Words: Cystoscope, Bladder neck stricture, Metal fatigue.

INTRODUCTION

Endoscope and instrument malfunction resulting in patient morbidity has been reported in virtually every surgical discipline including head and neck surgery, dental surgery, orthopedics, and obstetrics.¹⁻⁷ Although instrument breakage is a rather uncommon event, certain procedures are prone to this complication.^{2,4,8} Cystoscope failure resulting in a urinary bladder foreign body, to our knowledge, has not been reported. The following case report describes an unusual case of a cystoscope rupture, manufactured 13 years before, resulting in a transient bladder foreign body leading to an ingenious measure for retrieval.

CASE REPORT

The patient was 72-year-old male with a history of diabetes, hypothyroidism, asthma, 20 years of smoking, and hyperlipidemia. He had a radical prostatectomy for prostate cancer in 1993. He had a urinary sphincter placed in 2006 for total incontinence. He had undergone previous anastomotic stricture incisions at the time of his artificial urinary sphincter insertion in 2006, with a recurrent bladder neck contracture treated with a laser ablation of the stricture in October 2008.

In March 2009, he came under our care, and bicalutamide was added to his treatment, because of a PSA of 10.24 ng/mL despite being treated previously with an LHRH agonist. CAT and bone scans for staging were negative. In July 2009, he once again had a urethral dilation and laser incision of the bladder neck finding a 2-cm to 3-cm area of white fibrous material that could not be passed with a rigid cystoscope. A 5 open ended catheter (Cook, Spencer IN, USA) was used to place a guidewire and then was dilated with dilators up to 18 French, and then with a 17 French cystoscope (Karl Storz GmbH & Co.KG, Tuttlingen, Germany. Manufactured in March 1997), and by using a 550 micrometer laser fiber the 5 and 7 o'clock positions were opened.

In March 2010, the stricture recurred as diagnosed via flexible cystoscopy. The Storz 17-French rigid scope was introduced into the urethra after deactivation of the sphincter. Once the bladder neck was reached, it was not

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DOI: 10.4293/108680811X13125733356710

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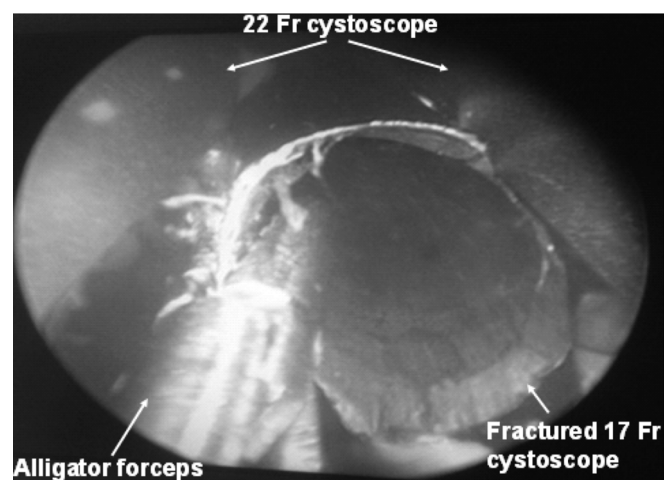


Figure 1. Fractured 17-French fragment engaged with alligator forceps within a 22-French scope.

possible to advance beyond the pinpoint narrowing, and there was some stone material identified. A Bentson guide-wire was passed and the scope removed, dilating the neck with 12- and then 18-French Cook dilators. The 550 micrometer holmium laser was introduced through the 17-French scope, and on a setting of 8 Hz and 0.8 Joules, the calculus within the bladder was fragmented. Next, the settings were changed to 1 Joule and a rate of 10 Hz, and a bladder neck electroincision was performed at the 5 and 7 o'clock locations, cutting through very dense tissue.

In the course of doing so, we had opened the bladder neck adequately, the 17 French scope was passing but the scope appeared to fracture acutely. We identified this immediately, withdrawing the sheath of the scope and noticing that 3cm of the end of the scope was missing. The scope had fractured along a weld line. This was not a result of stray laser energy. At this point, a 22-French scope was inserted under direct vision. Using alligator forceps and manipulation, we were able to tease the fractured 17 French sheath inside of the 22-French sheath with the jagged edge fully protected within the 22 French sheath by detaching the 22-French bridge, finally withdrawing the entire unit (**Figure 1**). The bladder was assessed by fluoroscopy to demonstrate that there were no metal fragments left within the bladder, and the removed foreign body was inspected against the fractured scope (**Figure 2**). A second cystoscopy was done using a 22-French scope, demonstrating that the artificial sphincter was intact. A 16-French Council catheter was passed over the wire and placed to straight drainage for 24 hours. The patient received prophylactic antibiotic coverage and was maintained on Ciprofloxacin for 2 weeks considering

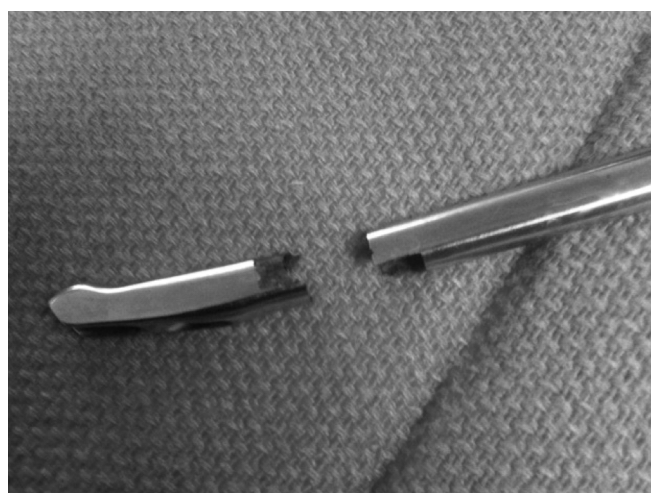


Figure 2. Fractured 17-French scope after the distal fragment was retrieved from bladder.

the degree of manipulation in the context of an artificial sphincter. On follow-up, his sphincter is functioning normally 1 month after the procedure. We concluded that the scope failure occurred due to a crack that formed in the metal composing the weld line. Eventually, the crack grew until it fractured after repeated cycles of stress due to routine use and sterilization, an event compatible with the term "metal fatigue."

DISCUSSION

Since the earliest days of medicine, physicians and healers have sought ways of looking into the living human body. The first cystoscopes by Bozzini, Desormeaux, Wales, Nitze, and Leiter were clumsy, difficult to use and hot, with rudimentary optics that rendered small, distant, inverted and backward images.⁹ The modern cystoscope is the product of centuries of development after the valuable improvements made over the years with the advent of lenses, prisms, incandescent light, the introduction of instrumentation, and the invention of fiberoptics and digital imaging.¹⁰ Currently, the cystoscope is an invaluable tool that allows the urologist to directly visualize the lower urinary tract anatomy, deliver medications, retrieve tissue, and access the upper urinary tract. In this case, the 17-French rigid scope was used due to the artificial sphincter and the need for precise control of the laser fiber. Although instrument failure that leads to a foreign body is a very unusual event, the surgeon needs to be prepared in the event this complication occurs, and has to be able to remove any residual fragment before it causes any further damage.^{3,11} Methods of removal of the foreign body must be individualized to the patient and circumstance. In

this case, the 22-French rigid scope sheath provided adequate protection for the urethra. Also, it is strongly recommended that the instruments be inspected looking for signs of metal fatigue prior to use. We have incorporated this into our safety checklist.

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